



# 14x22 Flow Characterization Study Boundary Layer Data Summary

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*(Excerpted and updated from internal presentation given April 19, 2007)*



# Background



- 3-D High-Lift Flow Physics Test Program (2001-2003)
- Trap Wing model tested in 14- by 22-Foot Subsonic Wind Tunnel at NASA Langley Research Center
- Development of a database to validate CFD methods and predictive capabilities for high-lift configurations
- **Test 508**  
New BLRS grate installed and tested
- **Test 509**  
Flow Characterization Study
- **Test 506**  
Force and moments, surface pressures, and boundary layer transition measurements using hot films
- **Test 513**  
Off-body flow measurements

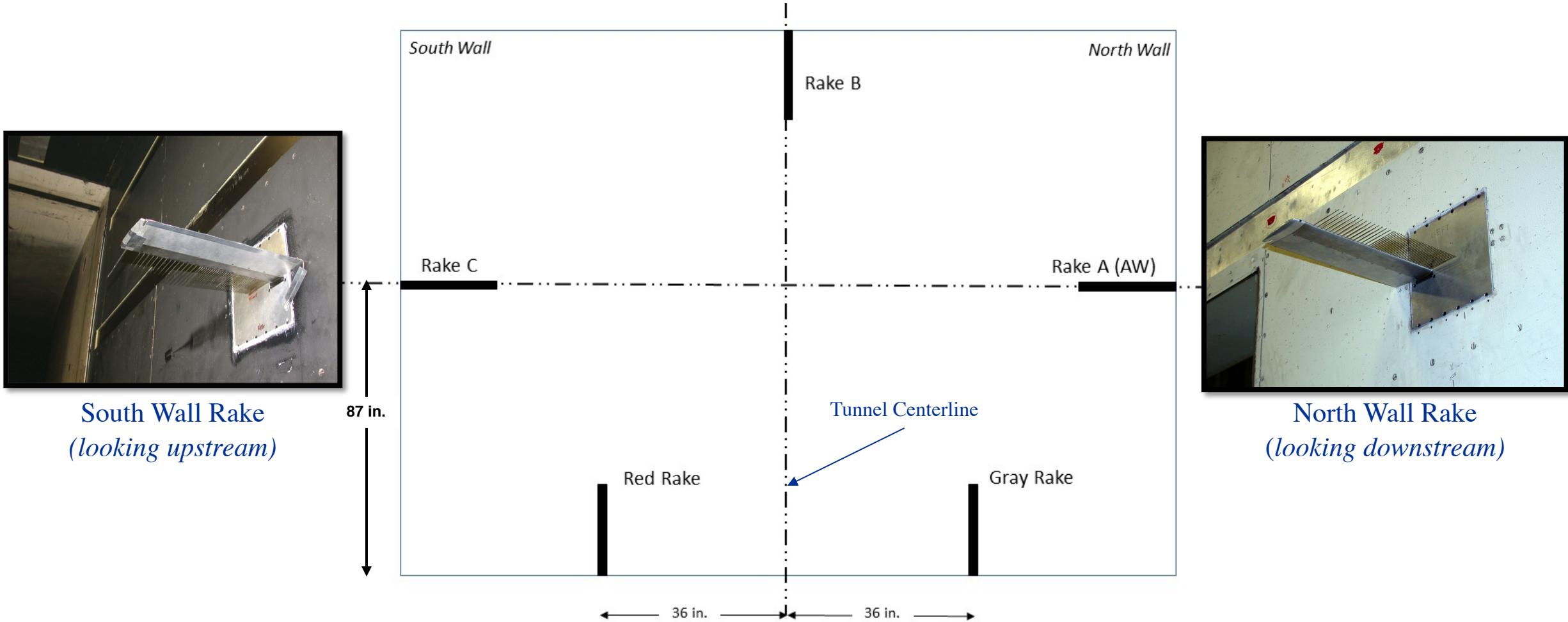


# Boundary Layer Data Summary

- Boundary layer profiles acquired during Tests 509 and 506
- Test 509
  - empty tunnel
  - Probes on ceiling, north wall, and south wall
  - $Q = 40, 60, 80, 120, \text{ and } 140 \text{ psf}$
  - Boundary Layer Removal System (BLRS) on and off
  - Hot-wire attached to boundary layer rake on north wall
- Test 506
  - model installed
  - Probes on ceiling, floor, north wall and south wall
  - $Q = 60 \text{ psf}$
  - Boundary Layer Removal System (BLRS) on

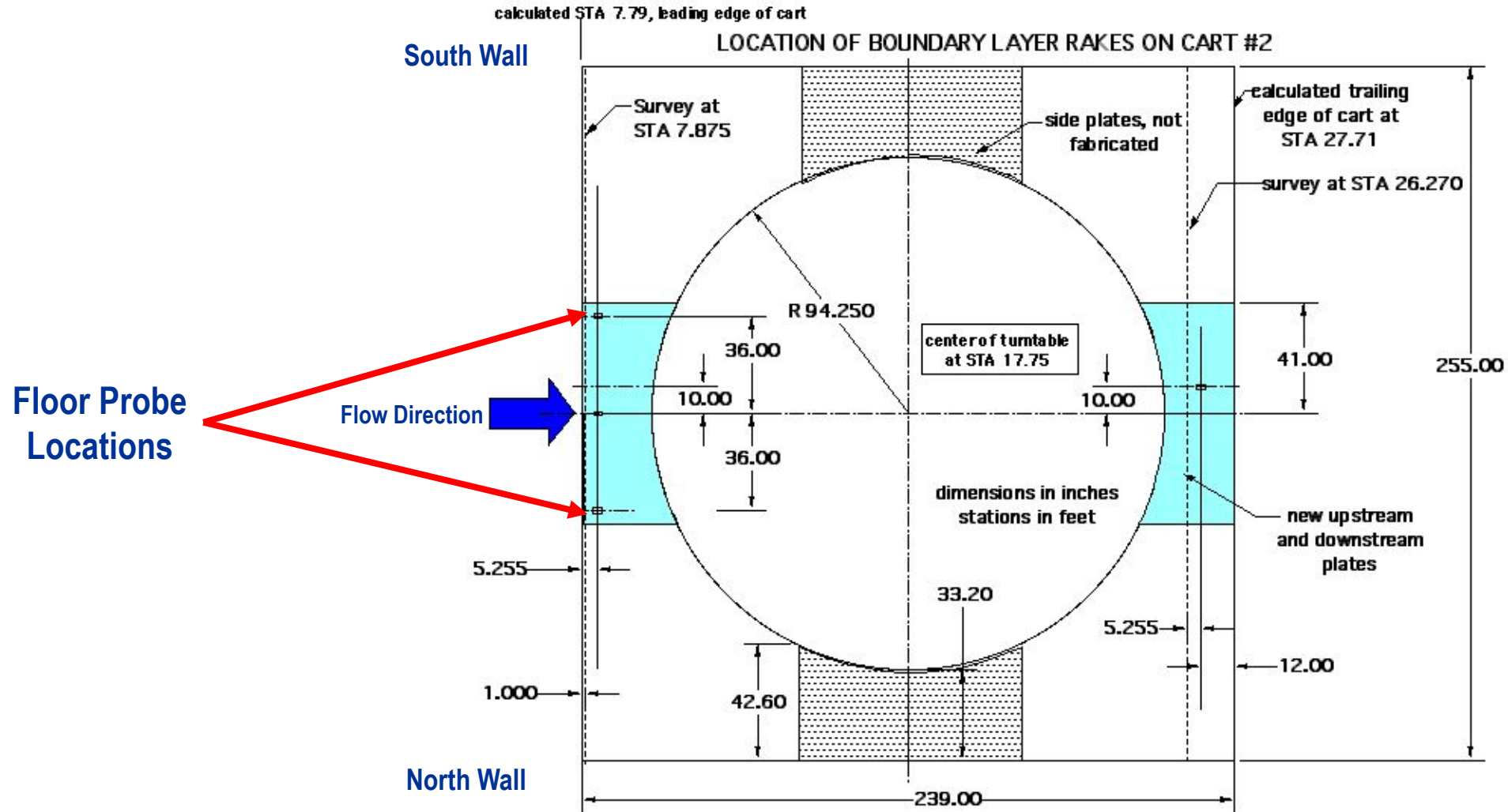
***Note:** Only select results from **Test 509** are included in this presentation.*

# Boundary Layer Probe Locations - Test 509



View looking downstream from test section entrance.

# Boundary Layer Probe Locations (Floor) – Test 509



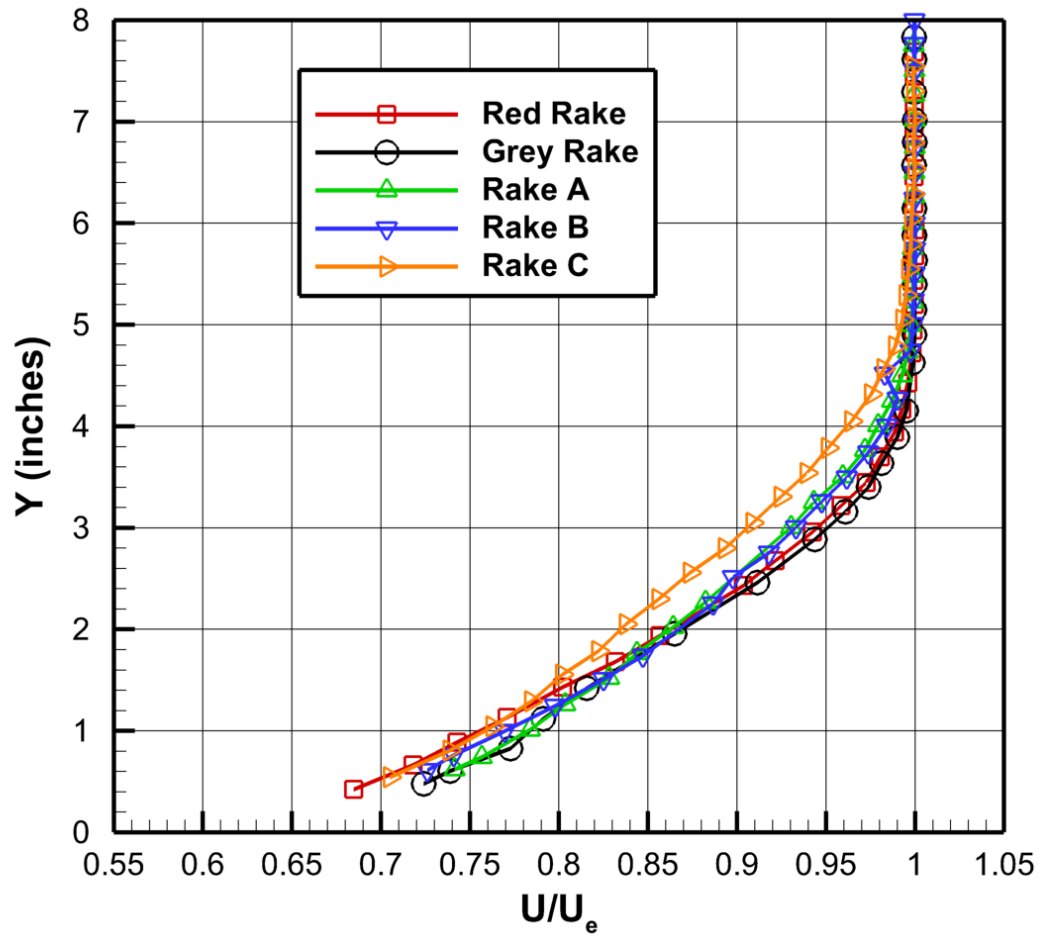
View looking down on tunnel floor.



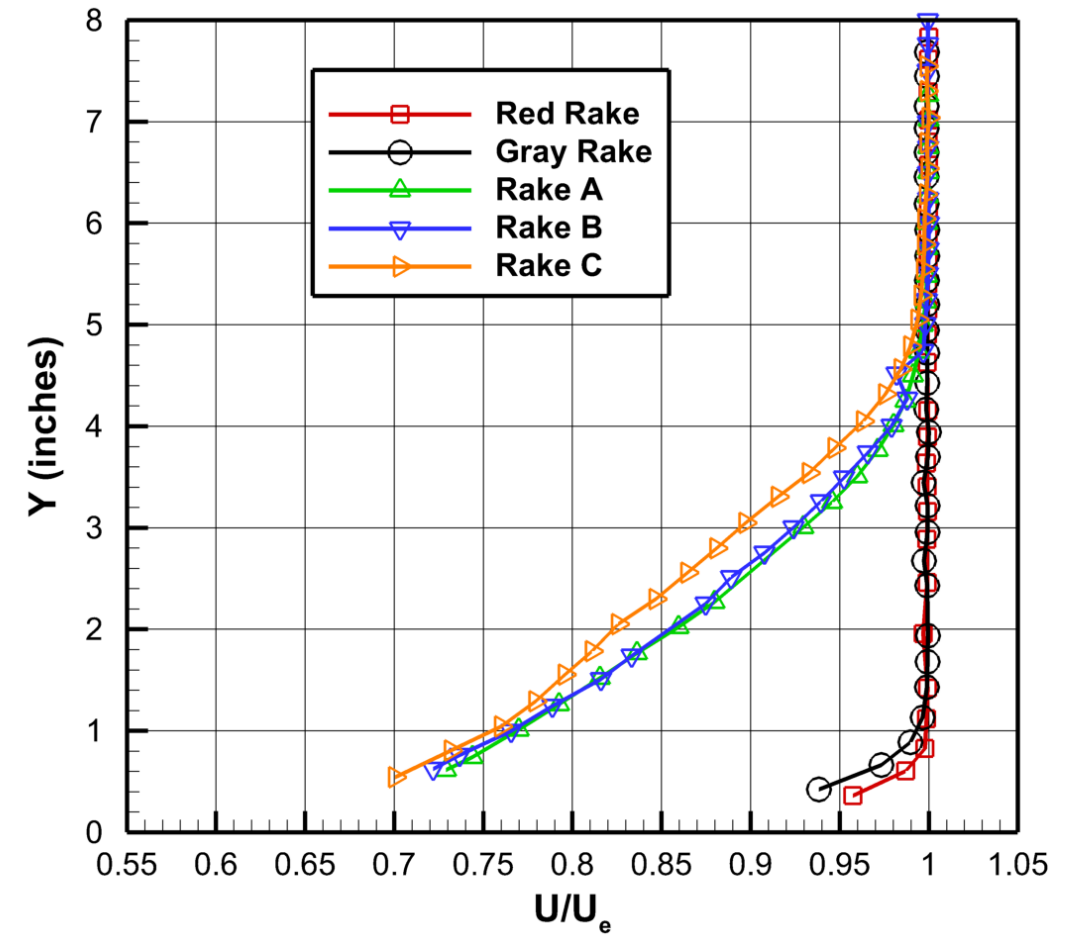
# 14x22 Boundary Layer Profiles

Test 509,  $X = 7.87$  ft,  $Q = 60$  psf, Mach = 0.2

BLRS Off (Run 137)



BLRS On (Run 138)



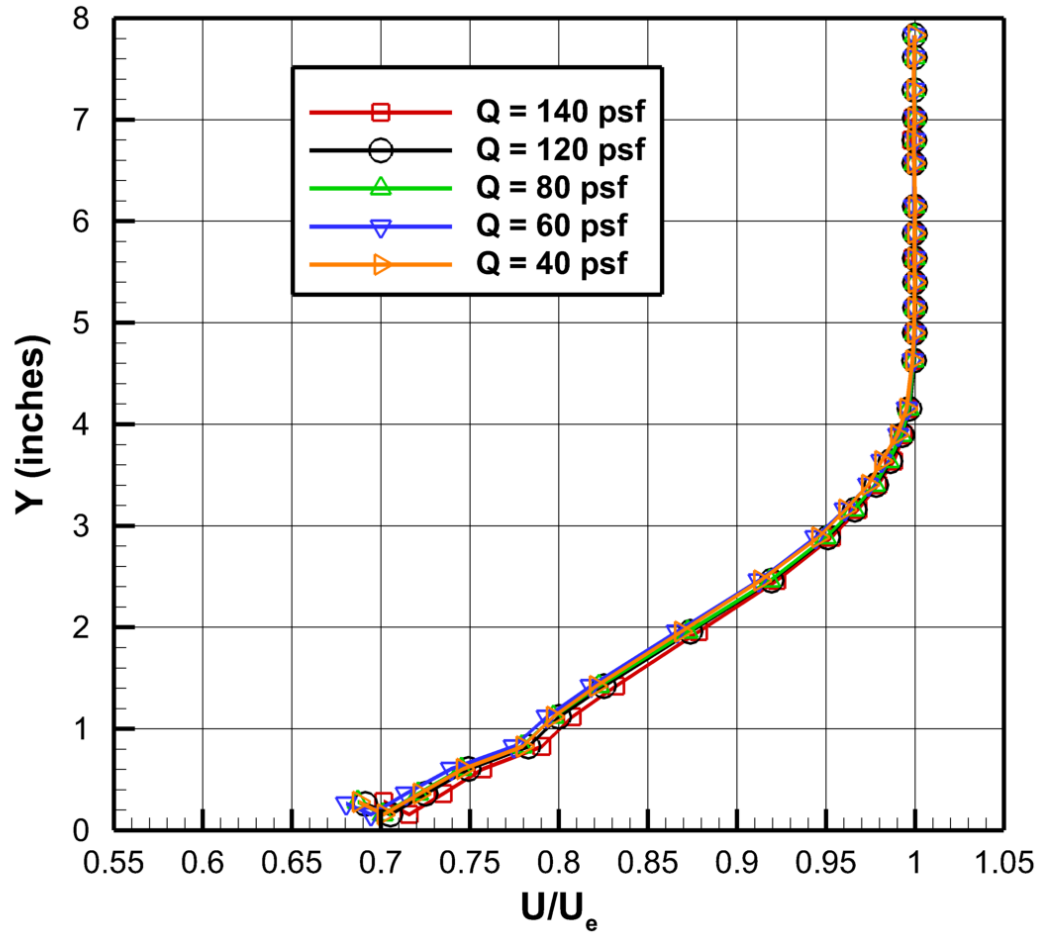




# 14x22 Boundary Layer Profiles

Test 509, X = 7.87 ft, Gray Rake, Q Variation

BLRS Off (Run 137)



BLRS On (Run 138)

